A2 Computer Science Quad Test – Sections 1 to 3 08/10/2025
Components of a Computer, System Software and Software Development.

Name: Group: Mark: /70 Grade:

Answer all questions. Calculators not permitted.

1. A processor contains a number of special registers.

   (a) Explain the function of each of the following and describe how they are used:

   (i) The program counter (PC) [2]

   (ii) The current instruction register (CIR) [2]

   (b) Explain what is meant by **pipelining** and why it is used in some processors. [3]

   (c) Describe **two** differences between CISC and RISC architecture. [4]

2. (a) Describe the differences between a graphics processing unit (GPU) and a quad-core computer in a personal computer. [4]

   (b) Name **two** other applications, apart from graphics processing, for which a GPU, used in conjunction with a CPU, may be used. [2]

3. (a) An operating system is required to manage interactions between the user, the application software and the hardware. Describe **two** functions the operating system provides. [4]

(b) The operating system may use a paging table. Explain what is meant by a paging table and why it is necessary. [3]

If the demands for memory within a system exceed the available RAM, an area of the hard drive can be designated as virtual memory to cope with the demand.

(c) Explain why using virtual memory is not as effective as adding more RAM. [2]

4. (a) Explain the term **bytecode**. [2]

(b) Explain how bytecode improves portability. [2]

(c) Explain what is meant by a **virtual machine**. [2]

5. (a) When high level code is compiled it goes through several stages. Describe the role of the following in the compilation process:

(i) Lexical analysis (lexing) [2]

(ii) Parsing / syntax analysis [2]

(iii) Symbol table [2]

(b) State the stage in the compilation process when the compiler is most likely to detect an error in the following programs. Assume the whole program is shown in the example.

(i)
```
animal = "cat"
PRNIT animal
```
[1]

(ii)
```
cost_per_mile = 3
journey_cost = cost_per_mile * miles
```
[1]

(c)

OCR Solutions make use of software libraries when writing their programming code. They also make use of linkers and loaders to compile and run the program.

(i) Describe what **linker** means.

[2]

(ii) Describe what **loader** means.

[2]

7. (a) What is an *algorithm*? [1]

(b) Describe **three** properties of a good algorithm. [3]

8. (a) What is a programming paradigm? [1]

(b) Prolog is an example of a declarative programming language.

Describe briefly **three** features of a declarative programming language which distinguish it from a procedural language. [6]

(c) State, with a reason, an application for which a declarative language such as Prolog is a suitable language. [2]

9. a) Describe **two** advantages of the object-oriented approach over the structured approach to program design. [4]

b) Explain the following terms:

(i) Polymorphism [2]

(ii) Encapsulation [2]

10.

OCR DogCare look after dogs while their owners are at work. They use a program developed in an object-oriented paradigm to store details about each dog.

Each dog is declared by using an instance of the class `Dog`. This has these private attributes:

- `name`
- `breed`
- `height`
- `weight`

The constructor method sets all the attributes to the values passed in as parameters.

Write pseudocode or program code to define the class `Dog`. You should include the attributes and constructor method.

You **do not** need to write the set or get methods.

10. [5]

Total marks: 70

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